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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* SCHLUMBERGER TECHNOLOGY INFORMATION

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Appeal 2008-6047  
Application 10/027,727  
Technology Center 3600

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Decided: December 18, 2008

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Before JAMESON LEE, RICHARD TORCZON, and SALLY C.  
MEDLEY, *Administrative Patent Judges*.

LEE, *Administrative Patent Judge*.

DECISION ON APPEAL

A. STATEMENT OF THE CASE

This is a decision on appeal by the real party in interest, Schlumberger Technology Information (STI), under 35 U.S.C. § 134(a) from a final rejection of claims 1, 7, 17, 18, 22, 23, 25, 27, 28, 30, 33, and 35. STI

requests reversal of the Examiner's rejection of those claims. We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

References Relied on by the Examiner

Renfro et al.	5,619,008	Apr. 8, 1997
Chawla et al.	6,619,176	Sep. 16, 2003

The Rejections on Appeal

The Examiner rejected claims 1, 7, 17, 22, 23, 25, 27, 28, 30, 33, and 35 under 35 U.S.C. § 102(e) as anticipated by Renfro et al. (Renfro).

The Examiner rejected claims 17 and 18 under 35 U.S.C. § 102(b) as anticipated by Chawla et al. (Chawla).

The Invention

The invention relates to controlling the debris generated by the shaped charges during a perforating operation. (Spec. 1:¶ 1.)

Claims 1 and 17 are reproduced below (Claims App'x 17:2-5; 12-16):

1. A controlled debris perforating system, comprising:

a shaped charge having a charge case and an explosive material, the charge case defining at least one slot about which the charge case is adapted to fracture in response to detonation of the explosive material.

17. A method of using one or more shaped charges in a well, comprising:

providing a perforating string having one or more shaped charges, the shaped charges comprising a charge case defining at least one slot about which the charge case is adapted to fracture; and

conveying the perforating string into the well.

B. ISSUES

1) Does the evidence on this record establish that the term “charge case” is a term of art with an established meaning in the art?

2) Has STI shown that the Examiner erred in finding that Renfro’s liner 50 forms part of a “charge case?”

3) Has STI shown that the Examiner erred in finding that Chawla’s liner 36 forms a “charge case” and includes slots that are “adapted to fracture?”

C. FINDINGS OF FACT

1. STI’s specification does not define “charge case” as being limited to a particular structure.

2. Renfro discloses that a shaped-charge “includes the usual case, concave shaped explosive material packed against the inner wall of the case, and a metal liner lining the concave side of the shaped explosive.” (Renfro 1:21-27.)

3. That section of Renfro does not use the claim term “charge case.”

4. Renfro uses the term “charge case” only once in the context of describing prior art techniques for creating explosive material. (Renfro 1:65.)

5. Renfro does not identify a “charge case” by reference character.

6. Chawla does not use the term “charge case.”



a series of striations in the physical exterior of the skirt portion of the liner. This may encourage break up of the liner into smaller components during explosion reducing both the size of the carrot or slug and the total amount of debris, as the smaller components are more easily consumed by the explosion itself.

13. Chawla discloses a liner 36 with indentations 38 having cavities 40 that receive explosive charges 18 to form shaped charges 44. (Chawla 3:38-49.)

14. Chawla expressly discloses that the liner 36 forms a “housing for carrying shaped charges 44.” (Chawla 3:49-50.)

15. In Chawla, liner 36 is scored along marks 46 to form “clean breaks” in the liner surface. (Chawla 3:65-67.)

16. The clean breaks allow the liner to be “rolled, folded, fastened, or otherwise shaped to create a desired geometric exterior shape for insertion in a wellbore or other target environment.” (Chawla 3:67 to 4:3.)

17. Chawla discloses that the desired geometric shapes include “planar, oval, spherical, hemispherical, cylindrical, or any other desired shape.” (Chawla 4:3-7.)

18. Chawla’s Figure 4 shows a single liner 36 with a planar shape. (Chawla 4:23-24.)

19. Chawla's Figure 4 is reproduced below:

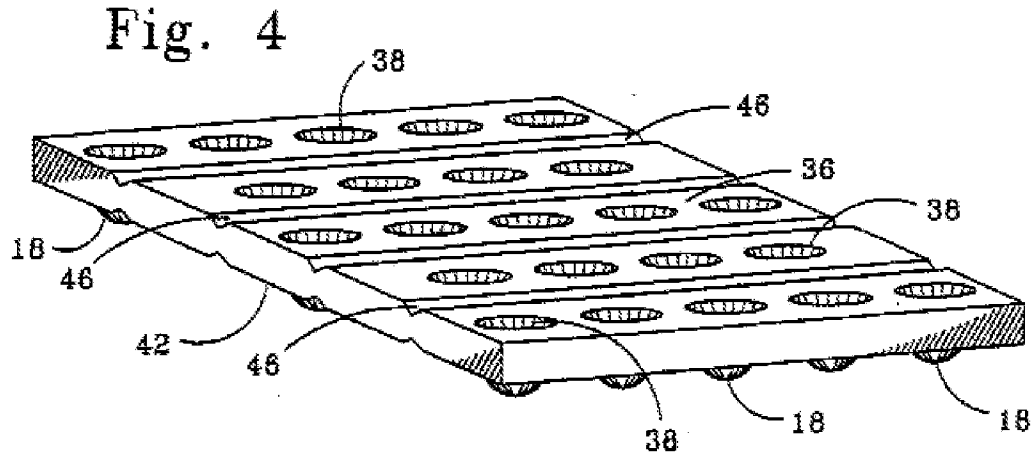


Figure 4 depicts a planar liner 36 that has multiple score marks 46 between rows of shaped charges. (Chawla 3:56-67.)

20. A person of ordinary skill in the art would have understood that thinner portions of liner characterized by less material have less strength than thicker portions with more material.

21. None of Chawla's Figures show a liner with less than multiple columns of shaped charges.

22. Chawla's Figure 5 shows one embodiment of an apparatus in which a liner 36 is formed into a cylindrical shape suitable for insertion within a well. (Chawla 4:8-10.)

23. Liner 36 surrounds a detonator 34 and includes a plurality of shaped charges 44 arranged along the length of the liner. (Chawla 4:10-13.)

24. Upon detonation, the plurality of shaped charges 44 produce "perforating jets" that may be oriented in multiple directions to achieve maximum penetrating density within the well. (Chawla 4:20-28.)

D. PRINCIPLES OF LAW

To establish anticipation under 35 U.S.C. § 102, each and every element in a claim, arranged as is recited in the claim, must be found in a single prior art reference. *Karsten Manufacturing Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001).

During examination, claim terms are given their broadest reasonable interpretation consistent with the specification. *In re Prater*, 415 F.2d 1393, 1404 (CCPA 1969).

E. ANALYSIS

The Examiner rejected claims 1, 7, 17, 22, 23, 25, 27, 28, 30, 33, and 35 as anticipated by Renfro. The Examiner also rejected claims 17 and 18 as anticipated by Chawla. STI argues the two grounds of rejection separately.

The rejection based on Renfro

We focus on the disputed limitations. The dispute centers on a limitation in each of independent claims 1, 17, and 33 relating to a charge case that is adapted to fracture.

In claim 1 the limitation reads (Claims App'x 17: 3-5):

the charge case defining at least one slot about which the charge case is adapted to fracture in response to detonation of the explosive material.

In claim 17 (Claims App'x 17:13-15):

the shaped charges comprising a charge case defining at least one slot about which the charge case is adapted to fracture.

In claim 33 (Claims App'x 12-13):



providing a shaped charge having a charge case defining at least one groove about which the charge case is adapted to fracture in response to detonation of an explosive.

The Examiner found that Renfro discloses a shaped charge with charge case formed by elements 14, 50, 60 taken together. (Ans. 3:18.) The Examiner also found that Renfro discloses, at column 5, lines 39-50, a plurality of slots about which the charge case fractures. (Ans. 3:21.) The section of Renfro cited by the Examiner describes a liner 50 with a skirt portion 60 that is machined to remove selective portions of material by “cutting, lathing, grinding, threading, scoring, and the like” (Renfro 5:42-45) in order to “provide proved improved break-up properties in the skirt portion of the liner, resulting in reduced debris” (Renfro 5:49-50). The Examiner explained that because liner 50 and skirt 60 form part of Renfro’s “charge case,” the removal of material from those components satisfies the requirement of slots or grooves that are adapted to fracture in response to detonation of explosive material. (Ans. 4:13-15.) The Examiner relied on a definition of the term “case” as meaning either a “container, as a box, crate, sheath, folder, etc.” or “a protective cover or covering part” in support of the position that Renfro’s liner 50 and skirt 60 are properly considered a “charge case.” (Ans. 4:18-19.)

STI argues that the term “charge case” is a term of art in the field of shaped charges and that a person of ordinary skill in the art would not use a definition of “case” from a non-technical dictionary for the meaning of “charge case.” (Reply Br. 2:1-9.) STI contends that the meaning of “charge case” excludes treating Renfro’s liner 50 as forming any portion of a “charge

case.” (Reply Br. 2:10-19.) According to STI, liner 50 is not even a container or a covering part for a shaped charge. (Reply Br. 3:1-18.)

STI’s specification does not define “charge case” or require that it is limited to a particular structure. To support its position that the term has a special meaning established in the art, STI relies only on a description in the Background section of Renfro which discloses that a shaped-charge “includes the usual case, concave shaped explosive material packed against the inner wall of the case, and a metal liner lining the concave side of the shaped explosive.” (Reply Br. 2:10-17 citing Renfro 1:21-27.) That section of Renfro is nebulous and does not use the claim term “charge case.” The description of a “usual case,” whatever that means, and a “metal liner” does not establish that the term “charge case” is a term of art with a well known and established special meaning. Neither does it establish that “charge case” is limited to only the “usual case” and excludes other components such as the “metal liner.” STI has submitted no testimony from any technical witness with regard to the alleged “term of art” nature of a “charge case” or with respect to what constitutes a “usual case.”

The Examiner relied on both Renfro and Chawla as evidence in the field of explosive shaped charges. Neither reference identifies a “charge case” by reference character. Indeed, Chawla does not even use the term “charge case.” In Renfro, that term appears only once in the context of describing prior art techniques for creating explosive material. (Renfro 1:65.) Renfro does not provide any further detail as to what constitutes a “charge case.”

On this record, STI has not established that “charge case” has a special and particular meaning as a term of art in the shaped explosive charge art.

Renfro’s Figure 1 is reproduced below:

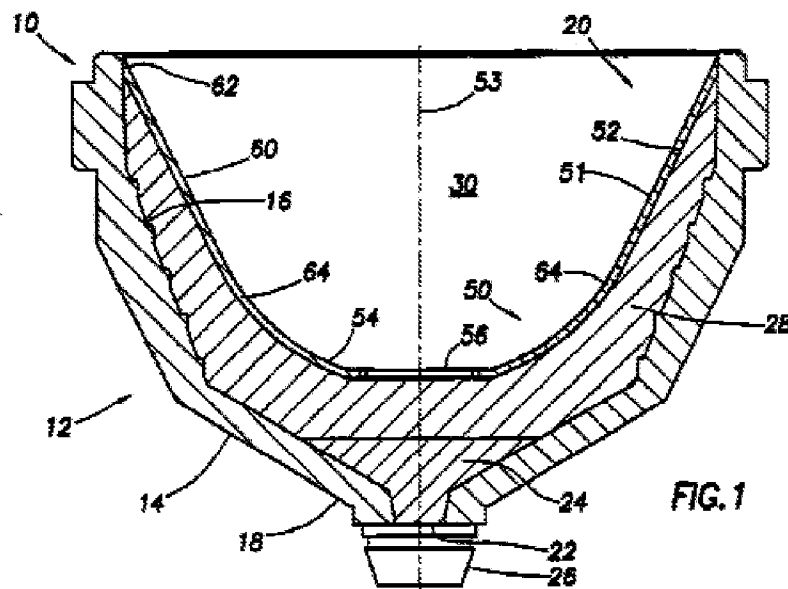


Figure 1 shows a cross-section of an assembled shaped-charge.

As shown in Renfro’s Figure 1, a shaped explosive 28 is contained between the skirt portion 60 of liner 50 and housing 12. (Renfro 7:27-28) Housing 12 includes an outer wall 14 and an inner wall 16. Renfro expressly provides that both the liner 50 and inner wall 16 are elements that bound the shaped explosive 28 (Renfro 7:55-57):

Except at the opening 56, the shaped explosive 28 is bounded by the housing inner wall 16, the initiation charge 24, and the convex outer surface 52 of the liner 50.

During examination, claim terms are given their broadest reasonable interpretation consistent with the specification. *In re Prater*, 415 F.2d at 1404. Renfro’s Figure 1 shows that liner 50 serves as a component covering

the top of shaped explosive 28. The above-quoted section discloses that liner 50 is a bounding portion of the shaped explosive 28. In light of those teachings, the Examiner found that liner 50 acts as a covering part of the shaped explosive. The Examiner relied on a meaning of “casing” that includes “a protective cover or covering part.” That meaning is reasonable and is not inconsistent with STI’s specification. In Renfro, both liner 50 and the inner wall 16 of housing 12 form covering portions for the shaped explosive 28. The Examiner reasonably determined that the liner and housing taken together form a “charge case.”

Furthermore, Renfro discloses that liner 50 undergoes a machining process. That process is disclosed as forming (Renfro 3:66 to 4:4):

a series of striations in the physical exterior of the skirt portion of the liner. This may encourage break up of the liner into smaller components during explosion reducing both the size of the carrot or slug and the total amount of debris, as the smaller components are more easily consumed by the explosion itself.

The Examiner found that those striations formed in the skirt portion of liner 50 satisfy the requirement of either a groove or slot “about which the charge case is adapted to fracture in response to detonation” of an explosive material. STI does not contest the finding that the striations are grooves or slots. In the above-quoted section, Renfro expressly discloses that the striations encourage break up of the liner during explosion. That is, Renfro’s liner 50 is adapted to fracture about the striations in response to detonation of explosive material 28. Because liner 50 forms part of a charge case, the striations are also part of the charge case. STI has not shown that the Examiner erred in determining that Renfro discloses a charge case that

defines a slot or groove about which the charge case is adapted to fracture in response to detonation of explosive material.

For the foregoing reasons, we sustain the rejection of 1, 17, and 33 under 35 U.S.C. § 102(e) as anticipated by Renfro.

STI does not separately argue dependent claims 7, 22, 23, 25, 27, 28, and 30. We also sustain the rejection of claims 7, 22, 23, 25, 27, 28, 30, and 35 under 35 U.S.C. § 102(e) as anticipated by Renfro.

The rejection based on Chawla

The Examiner rejected claims 17 and 18 as anticipated by Chawla. Claim 18 is argued collectively with claim 17. STI disputes that Chawla satisfies the limitation of “providing a perforating string having one or more shaped charges, the shaped charges comprising a charge case defining at least one slot about which the charge case is adapted to fracture.”

The Examiner found that Chawla’s liner 36 forms a charge case for explosive charges 18 and identified the configuration in Chawla’s Figure 5 as showing the step of providing a perforating string. The Examiner further found that Chawla teaches forming score marks 46 in the liner 36 and that those score marks form a plurality of slots about which the liner is adapted to fracture. (Ans. 4:4-8.)

STI contends that Chawla’s score marks 46 are only present during a manufacturing step and only facilitate breaking of individual liners 36 from a solid sheet. (App. Br. 14:3-6.) STI argues that Chawla does not disclose that the score marks are present once the charge case is finally formed. According to STI, even if the marks are still present, those marks are not disclosed as being adapted to fracture. STI also contends that a liner can not even constitute a charge case of a shaped charge. (App. Br. 14:8-16.) STI

further contends that the Examiner has not shown where Chawla discloses providing a perforating string. (Reply. Br. 5:13-14.)

STI's arguments are not persuasive.

Chawla discloses a liner 36 with indentations 38 having cavities 40 that receive explosive charges 18 to form shaped charges 44. (Chawla 3:38-49.) Chawla expressly discloses that the liner 36 forms a "housing for carrying shaped charges 44." (Chawla 3:49-50.)

For the reasons discussed above, we reject STI's argument that "charge case" is a term of art with an established special meaning. The Examiner relied on a meaning of "case" that includes a "container." That meaning is not unreasonable or inconsistent with STI's specification. A housing that carries shaped charges within cavities contains those shaped charges. The Examiner reasonably determined that Chawla's liner 36 forms a case for shaped charges 44. We reject STI's argument that Chawla's liner 36 does not form a charge case for shaped charges.

Turning to the slot requirement of STI's claim 17, we note that claim 17 is different from claim 1 in that the slots are not required to cause the case to fracture "in response to the detonation of explosive material." In claim 17, the slots need only render the charge case "adapted to fracture." In that regard, the slot requirement in claim 17 is broader than in claim 1 and can be more easily met.

In Chawla, liner 36 is scored along marks 46 to form "clean breaks" in the liner surface. (Chawla 3:65-67.) The clean breaks allow the liner to be "rolled, folded, fastened, or otherwise shaped to create a desired geometric exterior shape for insertion in a wellbore or other target environment."

(Chawla 3:67 to 4:3.) Chawla's Figure 4 shows a liner 36 with multiple score marks 46.

Chawla's Figure 4 is reproduced below:

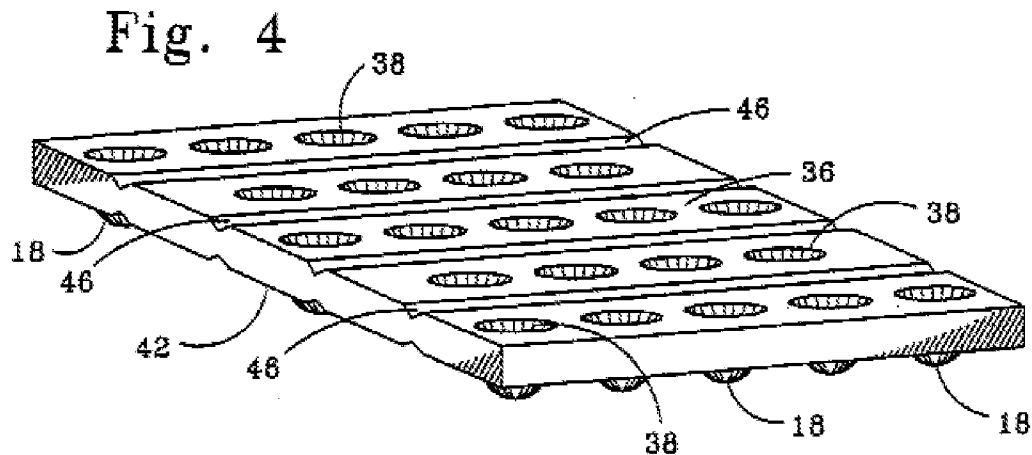


Figure 4 depicts a planar liner 36 that has multiple score marks 46 between rows of shaped charges. (Chawla 3:56-67.)

As shown in Figure 4, the score marks 46 are characterized by an absence of material at portions of the surface of liner 36 so that the liner is thinner at those marks. A person of ordinary skill in the art would have understood that thinner portions of liner with less material have less strength than thicker portions with more material. Thinner portions of the liner that are not as strong will break or fracture more easily than thicker, stronger portions. The Examiner reasonably determined that the score marks 46 in liner 36 are portions about which the liner is “adapted to fracture.”

Furthermore, STI argues that the score marks 46 only facilitate breaking of individual liners 36 from a solid sheet. According to STI, the liner shown in Chawla's Figure 4 is not an end product and that the end

product is one in which the individual columns have been broken off along the score marks 46. That argument is not well supported.

Chawla discloses only that the clean breaks along marks 46 are in the surface of the liner. (Chawla 3:66.) Chawla does not disclose that those breaks in the liner surface completely sever liner 36 into separate lesser liner portions having only a single column of shaped charges. None of Chawla's Figures show a liner with less than multiple columns of shaped charges.

Moreover, Chawla discloses that the final geometric shape of the liner can be "planar, oval, spherical, hemispherical, cylindrical, or any desired shape." (Chawla 4:3-7) (emphasis added.) Chawla's Figure 4 shows a liner 36 with a planar shape. (Chawla 4:56-63.) Chawla describes liner 36 as a "single liner." (Chawla 4:5.) The single liner shown in Figure 4 includes multiple breaks in the liner surface along marks 46. Chawla does not disclose that the single, planar liner 36 shown in Figure 4 is not a final planar shape of the liner. As shown in the Figure, in that planar shape, the multiple breaks in the liner surface along marks 46 are still present.

Additionally, Chawla does not disclose that the process of shaping the liner into any other shape removes the score marks. Neither does Chawla disclose that once the liner is shaped, the score marks are then filled in with material and eliminated. We reject STI's argument that Chawla's score marks will no longer exist once the liner is formed into its final shape.

Lastly, we reject STI's argument that the Examiner has not shown that Chawla satisfies the requirement of "providing a perforating string."

The Examiner identified Chawla's Figure 5 as showing the step of "providing a perforating string." Figure 5 shows one embodiment in which a liner 36 is formed into a cylindrical shape suitable for insertion within a



well. (Chawla 4:8-10.) The liner surrounds a detonator 34 and includes a plurality of shaped charges 44 arranged along the length of the liner.

(Chawla 4:10-13.) Upon detonation, the plurality of shaped charges 44 produce “perforating jets” that may be oriented in multiple directions to achieve maximum penetrating density within the well. (Chawla 4:20-28.)

STI does not explain why there is error in the Examiner’s finding that a teaching of providing an apparatus that produces a plurality of “perforating jets” does not teach “providing a perforating string.”

For all the foregoing reasons, STI has not shown that the Examiner erred in finding that Chawla satisfies all the limitations of claim 17.

We sustain the rejection of claims 17 and 18 under 35 U.S.C. § 102(b) as anticipated by Chawla.

#### F. CONCLUSION

1) The evidence on this record does not establish that the term “charge case” is a term of art with an established and special meaning in the art.

2) STI has not shown that the Examiner erred in finding that Renfro’s liner 50 forms part of a “charge case.”

3) STI has not shown that the Examiner erred in finding that Chawla’s liner 36 forms a “charge case” and includes slots that are “adapted to fracture.”

#### G. ORDER

The rejection of claims 1, 7, 17, 22, 23, 25, 27, 28, 30, 33, and 35 under 35 U.S.C. § 102(e) as anticipated by Renfro is affirmed.

The rejection of claims 17 and 18 under 35 U.S.C. § 102(b) as anticipated by Chawla is affirmed.

Appeal 2008-6047  
Application 10/027,727

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

MAT

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